

3.10/53)

$$a) \frac{d}{dx}(\sin^{-1}(x) + \cos^{-1}(x)) =$$

$$\frac{d}{dx}(\sin^{-1}(x)) + \frac{d}{dx}(\cos^{-1}(x)) =$$

$$\frac{1}{\sqrt{1-x^2}} + \frac{-1}{\sqrt{1-x^2}} = 0$$

$$b) \frac{d}{dx}(\tan^{-1}(x)) = \frac{1}{1+x^2}$$

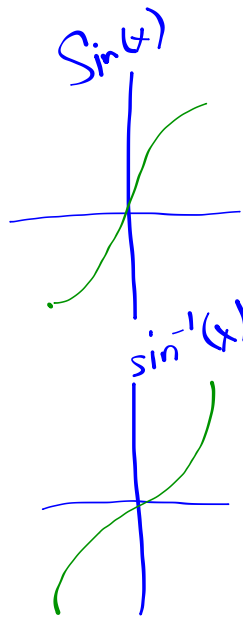
FALSE

NOT  $\sec^2(x)$ .

$$c) \frac{d}{dx}(\sin^{-1}(x)) = \frac{1}{\sqrt{1-x^2}}$$

NB: domain:  $(-1, 1)$ 

True-ish minimum occurs at  $x=0$   
 [deriv = 1]  
 No slope at endpoints  
 everywhere else denominator  $< 1$   
 so fraction  $> 1$



$$d) \text{ True } \frac{d}{dx}(\sin x) = \cos x. \text{ Range of } \cos x = [-1, 1]$$

$$e) f(x) = \frac{1}{x} \Rightarrow y = \frac{1}{x} \text{ so } x = \frac{1}{y} \text{ so } y = \frac{1}{x}$$

$$\text{true } (f^{-1})'(x) = f'(x) = -\frac{1}{x^2}$$

day 47

You should be able to find derivative rules for every inverse fn

True

Memorize advice

$$\frac{d}{dx}(\sin^{-1}(x))$$

$$\frac{d}{dx}(\cos^{-1}(x))$$

$$\frac{d}{dx}(\tan^{-1}(x))$$

$$\frac{d}{dx}(\sec^{-1}(x))$$

day 47

3.10/23)

$$\frac{d}{dy} \left( \cot^{-1} \left( \frac{1}{y^2+1} \right) \right)$$

$$\frac{d}{dx} (\cot^{-1}(x)) = \frac{-1}{1+x^2}$$

$$= \frac{-1}{1 + \left( \frac{1}{y^2+1} \right)^2} \cdot \frac{d}{dx} \left( (y^2+1)^{-1} \right)$$

$$= \frac{-1}{1 + \left( \frac{1}{y^2+1} \right)^2} \left( -(y^2+1)^{-2} (2y) \right)$$

$$= \frac{-2y}{(y^2+1)^2 \left( 1 + \left( \frac{1}{y^2+1} \right)^2 \right)} = \frac{-2y}{(y^2+1)^2 + \underbrace{(y^2+1)^2 \left( \frac{1}{y^2+1} \right)^2}_1}$$

3.X/54

day 47

$$f(x) = (x-1)\sin^{-1}(x) \text{ on } [-1, 1]$$

$$\begin{aligned} b) \quad f'(x) &= \frac{d}{dx}(x-1)\sin^{-1}(x) + (x-1)\left(\frac{d}{dx}(\sin^{-1}(x))\right) \\ &= \sin^{-1}(x) + \frac{x-1}{\sqrt{1-x^2}} \end{aligned}$$

$$c) \quad f'(x) = 0 \text{ when } 0 = \sin^{-1}(x) + \frac{x-1}{\sqrt{1-x^2}}$$

Quiz

FRIDAY

11/8

[ up through... ]  
3.7

day 47

HW: <sup>due</sup> Wed 11/6 3.9/74-75, 79-80

3.10/62-64, 67

3.11/19-22

4.1/6-12<sup>DO</sup>

Thurs 11/7

3.9/83-84

3.10/71-72

3.11/23-26

4.1/13-19

<sup>DOO</sup>

Fri-Tue 11/12

3.11/27-30

4.1/20, 23-26, 37-39, 55

4.2/1-10

